Small Business Innovation Research/Small Business Tech Transfer

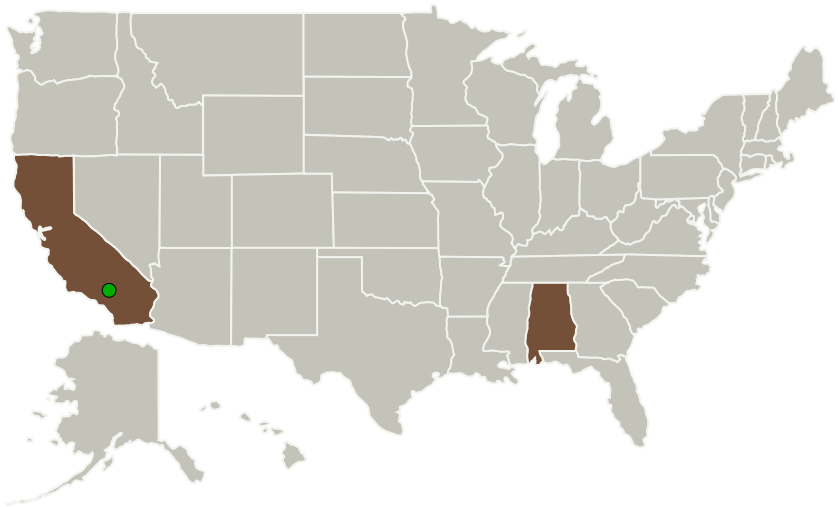
Nonlinear AeroServoElastic Reduced Order Model for Active Structural Control, Phase I

Completed Technology Project (2012 - 2012)

Project Introduction

The overall goal of the proposed effort is to develop and demonstrate rigorous model order reduction (MOR) technologies to automatically generate fully coupled, nonlinear, parameterized aeroservoelastic reduced-order models (ROMs) for smart material-based active structural control. The Phase I effort will focus on developing constituent nonlinear ROMs for aerodynamics, structural dynamics, and electromechanics of the smart materials, as well as an integration scheme for coupled aerodynamic, structural, and electromechanical analysis. A modular software framework enabling automated data exchange, ROM generation and computation, as well as verification will also be constructed. The feasibility of the proposed technologies will be demonstrated for several aeroservoelasticity test problems of NASA interest (including NASA's Aerostructures Test Wing.) The Phase II effort will focus on: (1) algorithm improvement in terms of execution efficiency, model parameterization, and automated parameter selection; and (2) software environment enhancement (such as developing a direct interface to NASA-relevant simulation tools, fully automated ROM process including data exchange, ROM generation and computation, and verification) and extensive technology demonstration in complex configurations and temporally varying operations.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
CFD Research Corporation	Lead Organization	Industry	Huntsville, Alabama
Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California

Primary U.S. Work Locations	
Alabama	California

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138366)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

CFD Research Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Yi Wang

Co-Investigator:

Yi Wang

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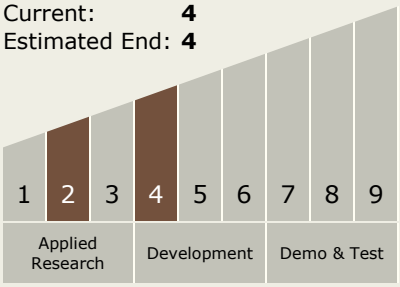
Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX15 Flight Vehicle Systems
  - TX15.1 Aerosciences
    - TX15.1.3 Aeroelasticity

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System